

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1(original) A quick start system for enabling rapid fuel cell power from sub-freezing initial conditions comprising:

a cell stack assembly having a sump containing water;

a heat exchanger;

first feed means for feeding a heat source to the heat exchanger;

a source of antifreeze coolant; and

second feed means for feeding antifreeze coolant to the heat exchanger for heating same and passing the heated antifreeze coolant to the sump for heating the water in the sump.

Claim 2.(original) A system according to claim 1 wherein the heat source comprises a catalytic combustor for combusting a mixture of fuel and air to produce a hot gas which passes to the heat exchanger.

Claim 3. (original) A system according to claim 2 further comprising a flash vaporizer downstream of the heat exchanger and upstream of the cell stack assembly for receiving the hot gas.

Claim 4.(original) A system according to claim 3 including third feed means for feeding water from the sump, in heat exchange relationship with the heated antifreeze coolant, to the flash vaporizer.

Claim 5.(original) A system according to claim 1 wherein the second feed means includes valve means for bypassing the heat exchanger wherein the antifreeze coolant is fed to the sump.

Claim 6.(original) A system according to claim 4 wherein the second feed means includes valve means for bypassing the heat exchanger wherein the antifreeze coolant is fed to the sump.

Claim 7.(original) A system according to claim 6 wherein the third feed means includes valve means for bypassing the flash vaporizer wherein the water from the sump is fed to the cell stack assembly.

Claim 8.(original) A system according to claim 4 including fourth feed means for feeding a fuel to the flash vaporizer.

Claim 9.(original) A system according to claim 8 wherein the flash vaporizer communicates with the cell stack assembly.

Claim 10.(original) A system according to claim 4 wherein the antifreeze coolant is contained in a closed loop.

Claim 11.(original) A system according to claim 2 wherein the fuel is H₂.

Claim 12.(original) A system according to claim 8 wherein the fuel is H₂.

Claim 13.(original) A method for providing a quick start for a fuel cell from sub-freezing initial conditions, comprising the steps of:

- providing a cell stack assembly having a sump containing ice;
- providing a heat exchanger;
- feeding a source of heat to the heat exchanger;
- feeding a source of antifreeze coolant to the heat exchanger for heating same;
- feeding the heated antifreeze coolant to the sump for melting a portion of the ice to water; and

passing the water from the sump to a flash vaporizer where it is mixed with a fuel and a combustion product from a catalytic combustor and vaporized to provide a hot air and steam feed for the cell stack assembly start up.

Claim 14.(original) A method according to claim 13 wherein the fuel is H₂.

Claim 15.(original) A method according to claim 13 wherein the combustion product of the catalytic combustor is the source of heat for the heat exchanger.

Claim 16.(original) A method according to claim 13 wherein the antifreeze coolant is heated to a temperature of between 100 to 175°C.

Claim 17.(original) A method according to claim 13 wherein the hot air/steam feed is heated to a temperature of between 100 to 125°C.

Claim 18.(original) A method according to claim 13 wherein the water passing from the sump to the flash vaporizer is heated indirectly by the heated antifreeze coolant passing from the heat exchanger to the sump.

Claim 19.(original) A method according to claim 13 further including the step of, after start up, bypassing the heat exchange with the antifreeze coolant and feeding the antifreeze coolant through the sump and to a radiator.

Claim 20.(original) A method according to claim 13 wherein the antifreeze coolant is in a closed loop.

Claim 21.(original) A method according to claim 19 wherein the antifreeze coolant is in a closed loop.

Appln No. 10/057,233
Amdt dated Jan. 6, 2004
Reply to Office action of Oct. 6, 2003

Claim 22.(original) A method according to claim 13 wherein the source of heat is at a temperature of $\leq 300^{\circ}\text{C}$.

Claim 23 (new) A system according to claim 1, wherein the anti-freeze coolant is fed through an anti-freeze coolant circuit which is not in fluid communication with the water.

Claim 24 (new) A system according to claim 23, wherein the anti-freeze coolant circuit is in heat exchange relationship with the sump whereby the heated anti-freeze melts ice in the sump.